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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,883	06/26/2003	Steven C. Avanzino	F0361.C1.D1	7845

22898 7590 05/27/2004

THE LAW OFFICES OF MIKIO ISHIMARU
1110 SUNNYVALE-SARATOGA ROAD
SUITE A1
SUNNYVALE, CA 94087

EXAMINER

SMOOT, STEPHEN W

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 05/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

10/608,883

Applicant(s)

AVANZINO ET AL.

Examiner

Stephen W. Smoot

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office action is in response to application papers filed on 26 June 2003.

Specification

1. The disclosure is objected to because of the following informality:

Update the Cross-Reference section to indicate that US Appl. Ser. No. 10/226,520 has issued as US Pat. No. 6,642,145 B1.

Appropriate correction is required.

Claim Objections

2. Claims 11, 15 are objected to because of the following informalities:

In claim 11, line 4, change "a opening" to --an opening-- to correct grammar; and

In claim 15, line 4, change "a opening" to --an opening-- to correct grammar.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 11-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Passemaid (US 2001/0004550 A1).

Referring to Fig. 10 and paragraphs [0024] to [0031], Passemaid discloses an interconnection structure for integrated circuits with the following features:

- The interconnection structure is formed over a semiconductor substrate (not shown), it being implied that the substrate has devices that are interconnected;
- The interconnection structure includes a sublayer of SiCH (11 in Fig. 3) and a sublayer of SiOCH (12 in Fig. 3); and
- Both sublayers (11, 12) have openings formed through them that are subsequently filled with copper (9).

These are all of the limitations set forth in claims 11-14 of the applicant's invention.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Passemard (US 2001/0004550 A1) in view of Ito (US 6,372,114).

Referring to Fig. 10 and paragraphs [0024] to [0031], Passemard discloses an interconnection structure for integrated circuits with the following features:

- The interconnection structure is formed over a semiconductor substrate (not shown), it being implied that the substrate has devices that are interconnected;
- The interconnection structure includes a sublayer of SiCH (11 in Fig. 3) and a sublayer of SiOCH (12 in Fig. 3);
- Both sublayers (11, 12) have openings formed through them that are subsequently filled with copper (9); and
- The copper (9) is planarized to the level of surrounding insulating material to define a copper line (i.e. a channel) that is interconnected to an underlying copper line (1) by a copper-filled via.

These are limitations set forth in claims 15-18 of the applicant's invention.

However, Passemard lacks a seed layer that lines the opening, which is a limitation set forth in claim 15 of the applicant's invention.

Ito teaches the use of a copper seed layer (109 in Fig. 1C) to line openings formed in an insulator (105 in Fig. 1C) for the subsequent plating of a copper layer (110 in Fig. 1D) to fill the openings (also see column 5, lines 9-43).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Passemard and Ito in order to fill the openings of Passemard with copper by using a plating process that includes a copper seed layer as taught by Ito. Copper plating is one known way to deposit copper and Ito recognizes that a seed layer is needed as an electrode for such plating processes (see column 5, lines 30-31).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Grill et al. teach the use of SiCOH as an interlayer. Mikagi and Morand et al. teach insulating layers that can be used as barriers.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00am to 4:30pm).

Art Unit: 2813

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SWS

Stephen W. Smoot
Patent Examiner
Art Unit 2813